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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/742,306

12/19/2003

Chng Han Shen

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02/09/2006

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EXAMINER

IM, JUNGHWA M

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 02/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No. 10/742,306	Applicant(s) SHEN ET AL.	
	Examiner Junghwa M. Im	Art Unit 2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 November 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 December 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>3/2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of claims 2, 13-24 and 26 in the reply filed on November 21 2005 is acknowledged. Upon reconsideration, however, the examiner agrees that claims 3-12 and 27-35 are readable on all the figures. The restriction requirement is therefore withdrawn.

Drawings

The drawings are objected to because a portion labeled 10 in Figure 5 should be "210." Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-10, 12-21, 23-33 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi et al. (US 6765299), hereinafter Takahashi in view of Yanagida (US 6204558).

Regarding claim 1, Fig. 1 of Takahashi shows a die, comprising:

a substrate [101; supporting substrate];

two or more various shaped bump structures [106, 107, 116, 117] formed over the substrate;

each of the two or more various shaped bump structures having a solder line; and

an epoxy layer [130] formed over the substrate; the epoxy layer having a top surface.

Fig. 1 of Takahashi shows most aspect of the instant invention except “a) the solder lines are below the top surface of the epoxy layer; b) the solder lines are above the top surface of the epoxy layer; or c) some of the solder lines are below the top surface of the epoxy layer and some of the solder lines are above the top surface of the epoxy layer.” Fig. 1C of Yanagida shows a semiconductor device wherein the solder lines of the stacked solder bumps are above the top surface of the epoxy layer.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Yanagida into the device of Takahashi in order to have the solder lines of the stacked solder bumps above the top surface of the epoxy layer for easier soldering.

Regarding claim 2, Fig. 1 of Takahashi shows that one or more of the two or more various shaped bump structures have a first height and one or more of the two or more various shaped bump structures have a second height that is less than the first height.

Regarding claim 13, Fig. 1 of Takahashi shows a die, comprising:

a substrate [101; supporting substrate];

two or more various shaped bump structures [106, 107, 116, 117] formed over the substrate; each of the two or more various shaped bump structures having a solder line;

one or more of the two or more various shaped bump structures having a first height and one or more of the two or more various shaped bump structures having a second height that is less than the first height; and

an epoxy layer [130] formed over the substrate; the epoxy layer having a top surface .

Fig. 1 of Takahashi shows most aspect of the instant invention except “a) the solder lines are below the top surface of the epoxy layer; b) the solder lines are above the top surface of the epoxy layer; or c) some of the solder lines are below the top surface of the epoxy layer and some of the solder lines are above the top surface of the epoxy layer.” Fig. 1C of Yanagida shows a semiconductor device wherein the solder lines of the stacked solder bumps are above the top surface of the epoxy layer.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Yanagida into the device of Takahashi in order to have the solder lines of the stacked solder bumps above the top surface of the epoxy layer for easier soldering.

Regarding claims 3 and 14, Fig. 1 of Takahashi shows that the two or more various shaped bump structures have a round shape, a rectangular shape, a square shape, a bar shape or a circular shape.

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Regarding claims 4, 15 and 27, Fig. 1 of Takahashi shows most aspect of the instant invention including at least one of the two or more various shaped bump structures has a bar shape except “a width of from about 40 to 300 um and a length of up to about 3000 um.” However, it would have been obvious to one of ordinary skill in the art at the time of the invention made to have at least one of the two or more various shaped bump structures having a bar shape with a width of from about 40 to 300 um and a length of up to about 3000 um to accommodate a design specification, since it would have been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only in routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claims 5, 16 and 28, Fig. 1 of Takahashi shows most aspect of the instant invention including at least one of the two or more various shaped bump structures has a round shape except “a diameter of from about 40 to 300 um.” However, it would have been obvious to one of ordinary skill in the art at the time of the invention made to have at least one of the two or more various shaped bump structures having a round shape with a diameter of from about 40 to 300 um to accommodate a design specification, since it would have been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only in routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claims 6, 17 and 29, Fig. 1 of Takahashi shows most aspect of the instant invention including at least one of the two or more various shaped bump structures has a rectangular shape except “a width of from about 40 to 300 um and a length of from about 300 to 3000 um.”

However, it would have been obvious to one of ordinary skill in the art at the time of the invention made to have at least one of the two or more various shaped bump structures having a

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rectangular shape with a width of from about 40 to 300 um and a length of from about 300 to 3000 um to accommodate a design specification, since it would have been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only in routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claims 7, 18 and 30, Fig. 1 of Takahashi shows most aspect of the instant invention including at least one of the two or more various shaped bump structures has a rectangular shape except “a width of from about 100 to 200 um and a length of from about 350 to 1200 um.”

However, it would have been obvious to one of ordinary skill in the art at the time of the invention made to have at least one of the two or more various shaped bump structures having a rectangular shape with a width of from about 100 to 200 um and a length of from about 350 to 1200 um to accommodate a design specification, since it would have been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only in routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claims 8, 19 and 31, Fig. 1 of Takahashi shows most aspect of the instant invention including at least one of the two or more various shaped bump structures has a square shape except “a width of from about 40 to 300 um.”

However, it would have been obvious to one of ordinary skill in the art at the time of the invention made to have at least one of the two or more various shaped bump structures having a square shape with a width of from about 40 to 300 um to accommodate a design specification, since it would have been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only in routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claims 9, 20 and 32, Fig. 1 of Takahashi shows most aspect of the instant invention including at least one of the two or more various shaped bump structures has a square shape except “a width of from about 100 to 200 um.”

However, it would have been obvious to one of ordinary skill in the art at the time of the invention made to have at least one of the two or more various shaped bump structures having a square shape with a width of from about 100 to 200 um to accommodate a design specification, since it would have been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only in routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claims 10, 21 and 33, Fig. 1C of Yanagida shows most aspect of the instant invention including at least one of the two or more various shaped bump structures has a circular shape except “ an outer diameter of from about 100 to 2500 um.”

However, it would have been obvious to one of ordinary skill in the art at the time of the invention made to have at least one of the two or more various shaped bump structures having a circular shape with an outer diameter of from about 100 to 2500 um to accommodate a design specification, since it would have been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only in routine skill in the art. *In re Aller*, 105 USPQ 233.

Regarding claims 12, 23 and 35, Fig. 1C of Yanagida shows that the epoxy layer is comprised of thermosetting resin (col. 6, line 29-30).

Regarding claim 24, Fig. 1 of Takahashi shows that the two or more various shaped bump structures have two sets of heights.

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Regarding claim 25, Fig. 1 of Takahashi shows a die, comprising:

a substrate [101; supporting substrate];

two or more various shaped bump structures [106, 107, 116, 117] formed over the substrate; each of the two or more various shaped bump structures having a solder line;

the two or more various shaped bump structures having a round shape, a rectangular shape, a square shape, a bar shape or a circular shape; and

an epoxy layer [130] formed over the substrate; the epoxy layer having a top surface.

Fig. 1 of Takahashi shows most aspect of the instant invention except “a) the solder lines are below the top surface of the epoxy layer; b) the solder lines are above the top surface of the epoxy layer; or c) some of the solder lines are below the top surface of the epoxy layer and some of the solder lines are above the top surface of the epoxy layer.” Fig. 1C of Yanagida shows a semiconductor device wherein the solder lines of the stacked solder bumps are above the top surface of the epoxy layer.

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Yanagida into the device of Takahashi in order to have the solder lines of the stacked solder bumps above the top surface of the epoxy layer for easier soldering.

Regarding claim 26, Fig. 1 of Takahashi shows that one or more of the two or more various shaped bump structures have a first height and one or more of the two or more various shaped bump structures have a second height that is less than the first height.

Claims 11, 22 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takahashi and Yanagida as applied to claims 1, 13 and 25 above, and further in view of Degani et al. (US 6734539), hereinafter Degani.

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Regarding claim 22, the combined teachings of Takahashi and Yanagida show most aspect of the instant invention including at least one of the two or more various shaped bump structures has a square and/or rectangular shape, however, fail to shows that at least one of the two or more various shaped bump structures is employed as an RF shield or a Faraday cage. Fig. 11 of Degani shows a bump structure [111] is employed as an RF shield or a Faraday cage (col. 7, lines 36-49).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Degani into the device of Takahashi and Yanagida in order to have at least one of the two or more various shaped bump structures employed as an RF shield or a Faraday cage to reduce the noise.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junghwa M. Im whose telephone number is (571) 272-1655. The examiner can normally be reached on MON.-FRI. 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

jmi

A handwritten signature in black ink, appearing to read 'Eddie Lee', is positioned above the printed name.

EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800